ABSTRACT

The present invention relates to silicon dual inertial sensors made of a (110) silicon chip. The invention comprises at least an proof-mass, which is connected to an corresponding inner frame with a plurality of sensing resilient beams to make it easier for said proof-mass to move perpendicular to the surface of said silicon chip (defined as z-axis), and each inner frame is connected to the outer frame with a plurality of driving resilient beams, or connected to the common connection beam, which is then connected to central anchor with the common resilient beam to make it easier for said inner frame to move in parallel with the surface of said silicon chip (defined as y-axis). Each inner frame is driven by a driver to move in opposite direction along the y-axis, and also move proof-mass in the opposite direction along the y-axis, if there is a rotation rate input along the x-axis, it will generates a Coriolis force to make each said proof-mass to move in the opposite direction of the z-axis; if an acceleration is input along the z-axis, the specific force will move said proof-masses with the same direction; when said proof-mass move or oscillate, the capacitance of the capacitor formed with sensing electrodes will change due to the change of distance; hence the moving distance can be obtained by measuring the change of capacitance; as the rotation rate outputs an alternating signal, and acceleration outputs a direct signal, they can be separated with signal processing. The present invention utilizes the deep vertical etching characteristics of the (110) silicon chip to make the driving beam in order to control driving resonance frequency more precisely, and improves the yield rate and the performance of the gyroscope.